

**Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In The Matter Of

Wireless Broadband Task Force Request for
Comments on Issues Related to Commission's
Wireless Broadband Policies

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GN Docket No. 04-163

To: The Commission

COMMENTS OF QUALCOMM INCORPORATED

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SUMMARY

QUALCOMM applauds the Commission for the creation of the Wireless Broadband Task Force and is pleased to submit these comments and the accompanying materials to provide updated information about the rapid proliferation of wireless broadband services here in the United States and around the world based on the core wireless 3G CDMA (CDMA2000 and 3G WCDMA) technology that QUALCOMM has invented and licensed globally to more than 100 equipment manufacturers and our software and chips based on these technologies. The demand for ubiquitous, advanced high-speed wireless broadband service based on these technologies is growing rapidly, and wireless carriers around the world are rushing to keep up with this demand.

Current marketplace conditions establish that a wireless broadband technology cannot entirely meet consumer demand if it enables the provision of high-speed wireless service in a hot spot, but not everywhere. Likewise, a wireless broadband technology cannot entirely meet consumer demand if it enables the provision of high-speed wireless service just to someone via a laptop computer, but not via his or her cell phone and/or PDA. Moreover, a wireless broadband technology cannot entirely meet consumer demand if it enables the provision of service on an unlicensed basis, where the service is necessarily limited to due to severe constraints on coverage and range and the need to avoid harmful interference.

Rather, all indications are that the market today demands a ubiquitous wireless broadband technology, one that consumers can access wherever they are. It demands a wireless broadband technology that can operate in laptops, cell phones, PDAs, and a host of devices yet to be created by innovative manufacturers. This year, global cell phone shipments will be more than 10 times global laptop shipments. Indeed, this year, global cell phone shipments will be approximately four times total global personal computer (both laptop and desktop) shipments. The disparity is

not projected to narrow in the foreseeable future, and if anything, it will widen. And, the market demands a licensed wireless broadband service, one that can operate on an economic basis with broad coverage and range without suffering or causing harmful interference.

Wireless broadband service based on 3G CDMA (CDMA2000 and WCDMA) is the only solution that can meet these marketplace demands. Other wireless broadband technologies are interesting and useful in certain limited circumstances, but only 3G CDMA enables wireless network operators to deliver the service that the public seeks and allows them to do so on an economic and widespread basis.

The proof of this is in the pudding. More than 108 million people globally, including a large number in the United States, now subscribe to 3G service based on 3G CDMA technology. In particular, approximately 7 million people today enjoy ubiquitous, advanced high-speed wireless service via CDMA2000 1xEV-DO. This is the technology that Verizon Wireless has deployed in Washington, DC and San Diego, and that it will deploy throughout the country over the next two years. The 1xEV-DO technology, which delivers data at peak rates of 2.4 megabits per second and at average speeds of hundreds of kilobits per second in its initial version, has also been deployed with great success in Japan, Korea, and Brazil, and additional deployments are in the pipeline by other operators in the United States, Israel, Ecuador, Brazil, Taiwan, and Indonesia. This technology can be accessed today with a PCMCIA card plugged into a laptop here in the United States, but also primarily via wireless phones and PDAs in Japan and Korea, and these wireless phones and PDAs are also coming to the United States. Operators who have CDMA networks can deploy CDMA2000 1xEV-DO without any additional spectrum.

QUALCOMM is working on a series of significant enhancements to this CDMA2000 1xEV-DO technology. One enhancement is known as Revision A to the standard, a revision

which will substantially increase the data speeds on both the uplink and downlink. Other enhancements include quality of service software to allow operators to offer varying data and latency rates, provide multicasting with on-demand or network scheduled wireless multimedia content, video telephony, instant multimedia messaging, and offer many other exciting applications. QUALCOMM has already demonstrated Revision A to CDMA2000 1xEV-DO over many live networks.

There are also a series of high-speed, advanced wireless broadband technologies available and under development for operators with GSM networks, and many U.S. and foreign network operators are deploying these technologies. Wideband CDMA (WCDMA) technology (one of two internationally established 3G CDMA standards) currently enables a user to transmit and receive data at peak speeds of 384 kilobits per second. WCDMA technology is also accessed via laptop cards, phones, and PDAs. Here in the United States, Cingular and AT&T Wireless are in the process of deploying this technology, and additional deployments continue primarily in Japan and Europe.

QUALCOMM is also working on enhancing WCDMA technology. Carriers with WCDMA-based networks will be able to upgrade to HSDPA (high-speed downlink packet access) technology for WCDMA. HSDPA/WCDMA will enable users to transmit and receive data at varying peak rates from 1.8 megabits up to 7.2 megabits per second for chips that we expect to sample in the second half of 2005. QUALCOMM's initial phone chips with HSDPA/WCDMA technology will sample in the fourth quarter of 2004.

Finally, it is not sufficient to meet consumer demand for wireless broadband service by deploying one of these technologies standing alone, because consumers want the service wherever they go, not just in the coverage area of their particular service provider. To enable

global roaming, QUALCOMM is working on a series of multi-mode, multi-band chips so that a consumer will be able to use and enjoy wireless broadband service whether they happen to be in the coverage area of a GSM, CDMA2000, CDMA2000 1xEV-DO, WCDMA, or WCDMA HSDPA network.

Additional allocations of licensed spectrum for deployment of these 3G wireless services is always welcome and will be necessary as demand and use continue to grow, and in the case of some wireless operators now with AMPS, TDMA, and GSM networks, it is a necessity. Just as important, the Commission must maintain its longstanding policy of technology neutrality in the wireless area. A policy of technology neutrality has been absolutely critical to the great success of the American wireless industry. Moreover, the Commission should refrain from permitting unlicensed overlays and underlays in licensed spectrum used by wireless operators because these overlays and underlays will cause harmful interference to the licensed wireless services. As wireless broadband services continue to proliferate over cellular, PCS, and other licensed spectrum, it is important that the Commission maintain the twin bedrock policies of technology neutrality and protection of licensed services from harmful interference.

QUALCOMM's ultimate message in these comments is that ubiquitous, advanced high speed wireless broadband service over the licensed PCS and cellular networks based on 3G CDMA technology is going to be an increasingly popular and important way for American consumers and businesses to enjoy many exciting wireless services, from email to web browsing to video, audio, and multimedia downloads and messaging to mcommerce to a host of new services that no one can now foresee. Wireless applications will be socially useful in all kinds of ways. Just this past weekend, the American Red Cross used EV-DO here in Washington, DC to

assist in the provision of emergency medical services during the ceremonies for the opening of the World War II Memorial.

As these and other wireless services are developed and deployed, the FCC should maintain a regulatory regime that does not favor any particular technology, but rather permits all technologies to compete on fair and equal terms. Just as the U.S. Government maintains a policy of technology neutrality globally, so should the FCC as it carries out its duties here at home.

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COMMENTS OF QUALCOMM INCORPORATED

QUALCOMM Incorporated, by its attorney, hereby submits its Comments in the above-referenced proceeding to provide the Commission with updated information concerning the rapid proliferation of the 3G CDMA licensed wireless broadband technologies in the United States and around the world.

I. Background

QUALCOMM is a world leader in developing innovative digital wireless communications technologies and enabling products and services based on the digital wireless communications technologies that it develops. QUALCOMM has developed core technology known as code division multiple access (CDMA). This technology has been incorporated into standardized wireless technologies deployed by wireless carriers in the United States and around the world, including cdmaOne, which is the second generation (2G) version of CDMA, and CDMA2000 and Wideband CDMA (WCDMA, which is also known as UMTS), the third generation (3G) versions of CDMA, the third generation (3G) versions of CDMA. CDMA

technology uses licensed spectrum in the most efficient manner possible, to create as much capacity as possible for voice communications and the greatest speed and throughput for data.

CDMA is America's fastest growing digital communications technology. In the first quarter of 2004, wireless carriers deploying CDMA in North America gained 70% of all new wireless subscribers. Due to its unsurpassed voice quality, data delivery speeds and performance, system capacity, spectral efficiency, privacy, and inherent flexibility, virtually all third generation ("3G") wireless products and services are based on some form of CDMA.

Wireless operators are deploying a number of different CDMA technologies to provide 3G products and services. Operators who ran CDMA networks to provide 2G service are deploying CDMA2000 technologies (one of the two primary forms of 3G CDMA) so that they can offer 3G services without having to add spectrum. These technologies, which are known as 1X and 1xEV-DO, operate on 1.25 MHz channels, a narrow swath of spectrum. Other operators, who run GSM or TDMA-based networks for 2G services are in the midst of deploying WCDMA (the other primary form of 3G CDMA) to provide 3G services. WCDMA operates on 5 MHz channels, a much wider swath of spectrum. A third CDMA technology, a TDD-based (time division duplex-based) CDMA technology by the name of TD-SCDMA is being considered for deployment in China to enable the provision of 3G services on unpaired spectrum.

CDMA networks operate today in the United States on licensed PCS and cellular spectrum in the 800 MHz and 1.9 GHz bands, and operators have collectively spent tens and tens of billions of dollars on these networks. In addition, versions of CDMA may be deployed in terrestrial networks operating at the 700 MHz, 2500-2690 MHz , and 1.7/2.1 GHz bands. CDMA technology has also been deployed in satellite-based networks in the Ku-Band and the Big Leo Band.

CDMA is proliferating at a very rapid pace, here in the United States and around the world. As of March 2004, there were 202 million CDMA subscribers worldwide. 3G CDMA networks have been deployed by a total of 82 wireless operators, which are based in the United States and 39 other countries around the world. A total of 50 of those operators have reported that they already have a total of over 108 million subscribers for 3G CDMA services. Operators in the United States and elsewhere around the world who have deployed 3G CDMA have experienced dramatic and rapid growth in both in terms of numbers of subscribers and average revenue per subscriber.¹

The products and services based on 3G CDMA enable wireless data to be sent and received at very high speeds. For example, the first release of the 1xEV-DO technology, which has been deployed by Verizon Wireless initially in Washington, DC and San Diego and will be deployed throughout the country by the end of 2005, and which has also been deployed by other carriers around the world in countries such as South Korea, Japan, and Brazil, enables data to be received wirelessly at multi-megabit per second peak rates and average rates of hundreds of kilobits per second, speeds that are comparable to wireline broadband technologies such as cable modems and DSL. In addition, operators in Japan, Europe and elsewhere have deployed WCDMA-based (also known as UMTS) networks, which deliver data at peak rates of 384 kilobits per second and can be upgraded to HSDPA, which delivers multi-megabit per second peak rates. WCDMA technology will be deployed soon in the United States. In sum, 3G CDMA, in all of its flavors, enable subscribers to enjoy high-speed wireless data service on a ubiquitous basis, not just in a hot spot.

¹ Additional information about the proliferation of 3G CDMA services is available at www.3gtoday.com.

Moreover, QUALCOMM broadly licenses CDMA technology to more than 100 leading handset and infrastructure equipment manufacturers around the world. At present, there are 51 vendors who have manufactured 485 different 3G device models that are now commercially available in the United States and elsewhere around the world, a number that grows each week. These devices include a wide array of wireless phones, PCMCIA cards, PDAs, and the like. Accordingly, today, with 3G CDMA technology, consumers are able to access and use high speed wireless broadband services with the cell phones and PDAs they have already become accustomed to using, as well as via their laptop and desktop computers.

With this background, QUALCOMM now provides more detailed information about the 3G CDMA and 3G WCDMA wireless broadband technologies.

II. CDMA2000 Wireless Broadband Technology

As already explained, a number of wireless carriers with CDMA networks, including Verizon Wireless, are deploying a CDMA2000 wireless broadband technology referred to as 1xEV-DO. This technology delivers data at peak rates of 2.4 megabits per second and at average rates of hundreds of kilobits per second. Verizon Wireless has deployed 1xEV-DO technology on their licensed spectrum throughout Washington, DC and San Diego and will be deploying it nationwide over the next two years. EV-DO technology has also been deployed in Korea, Japan, and Brazil, and additional deployments are under way in Ecuador, Brazil, Indonesia, Israel, Taiwan, and in the United States. Today, over 7 million people use EV-DO technology for wireless broadband service, and the number of subscribers is growing at an ever-increasing pace each day. Ubiquitous, high speed wireless broadband service is provided today over licensed spectrum via 1xEV-DO technology.

PCMCIA cards with this technology so that it can be used with laptop computers are available today in the United States. In addition, in Japan and Korea, over 40 models of phones and PDAs with this EV-DO technology, made by a variety of manufacturers in a wide assortment of different and appealing designs and features, are on the market. Such devices will also come to the United States, allowing wireless subscribers to access new data services, such as email, web browsing, downloads, and the like.

QUALCOMM is hard at work developing a series of enhancements to this technology. One enhancement will greatly increase the speed for uploading data. This enhancement, known as 1xEV-DO Revision A, enables peak upload speeds of 1.8 megabits per second (as opposed to the present peak rate of 153 kilobits per second) and peak download speeds of 3.1 megabits per second (as opposed to the present peak download rate of 2.4 megabits per second). This technology has been standardized by the standards body (3GPP2) and is backwards compatible with existing 1X service, already deployed by many operators here in the United States (Verizon Wireless, Sprint PCS, ALLTEL, US Cellular, Leap, Metro PCS, etc.) and by others around the world, and it is backwards compatible with the first version of 1xEV-DO technology. Revision A to 1xEV-DO also dramatically reduces the latency in receiving and transmitting data, thereby improving the service for users.

There are a number of other enhancements to the 1xEV-DO technology that also enable new services and improve the user experience. For example, quality of service software will enable carriers to offer consumers different data rates at different price points and will assign faster data rates and lower latency for users who subscribe to services that need that enhanced performance, thereby permitting carriers to offer a host of exciting new services such as video telephony, video conferencing, and streaming video and audio. 1xEV-DO technology will also

enable multi-casting, the transmission of wireless video and audio either on an on-demand or network scheduled basis. The delivery of video and audio to a phone is already gaining traction in Korea and Japan and is expected to be an important aspect of wireless broadband service in the future.

Other enhancements in the works include the ability to transmit and receive instant multimedia messages and a series of improvements to overall system capacity by supporting phones with dual antennas and to sector capacity through improved equalizers. All of these enhancements will improve services, drive costs down, and enable wireless carriers who deploy 1xEV-DO to offer an even more popular and cost-effective ubiquitous wireless broadband service on their licensed spectrum.

III. WCDMA Wireless Broadband Technology

Most operators with legacy GSM networks have chosen WCDMA as their path to 3G CDMA. These operators (and even some without any legacy networks) are beginning to offer high-speed, high quality wireless broadband service over licensed spectrum via WCDMA. Wideband CDMA technology enables users to receive and send data at peak rates of 384 kilobits per second over a PCS or cellular network. There are PCMCIA cards to allow laptop users to use WCDMA technology, but as with 1xEV-DO, there are also a wide variety of wireless phones and PDAs with WCDMA inside, some 30 models in all. WCDMA networks are up and running today throughout Europe and in Japan and other parts of Asia, and WCDMA technology is coming to the United States, to be deployed initially by Cingular and AT&T Wireless. More than 4 million people subscribe to WCDMA networks, and this number, too, is growing at a rapidly increasing rate.

Because WCDMA uses 5 MHz channels, an operator who wishes to deploy WCDMA needs more spectrum than one who has a legacy CDMA network and wishes to deploy 1xEV-DO, especially if the former has a legacy AMPS, TDMA, and GSM network. Nevertheless, with sufficient spectrum, a wireless carrier can use WCDMA technology to offer high-speed, high quality ubiquitous wireless broadband service over licensed spectrum.

QUALCOMM is also working to enhance WCDMA technology in a number of ways. The most notable enhancement will permit much faster uploads and downloads of data. QUALCOMM is developing an upgrade for WCDMA networks to high-speed downlink packet access (“HSDPA”) technology. HSDPA will enable users to transmit and receive data at peak rates from 1.8 megabits per second up to 7.2 megabits per second, the fastest data rate yet achieved in a ubiquitous wireless broadband technology using licensed spectrum. Samples of the first QUALCOMM phone chips containing HSDPA will sample in the fourth quarter of 2004, and we expect the first QUALCOMM phone chips with HSDPA achieving the 7.2 megabits per second peak data rates to sample in the second half of 2005.

IV. Multi-Mode, Multi-Band Wireless Broadband Technology

Wireless subscribers want wireless broadband service that will work wherever they happen to go. They are typically unaware of any of the acronyms in these Comments. They simply want their email and broadband service whether they are within or outside of their carrier’s coverage area. To achieve truly ubiquitous, worldwide wireless broadband service, consumers are going to need phones, PDAs, and PCMCIA cards that will work on any licensed wireless network, whether it uses CDMA2000 or WCDMA technology. To that end, QUALCOMM is developing a series of multi-mode, multi-band chips. These chips will power wireless phones, PDAs, and PCMCIA cards that will work on networks with 1xEV-DO and

WCDMA and on the frequency bands used for PCS and cellular service here in the United States as well as in Europe, Asia, South America, Africa, and Australia.

The first phones with multi-mode, multi-band chips with a mixture of 3G and 2G technology are coming to market today. In the next few years, phones, PDAs, and laptop cards with multi-mode, multi-band chips that will work on 1xEV-DO and WCDMA networks will come to market, and consumers around the world will be able to take their wireless broadband service with them, no matter where they happen to travel. This feature will drive even greater demand for wireless broadband service over licensed spectrum.

V. The Public Policy Implications of These 3G Technologies

The foregoing technologies have been developed and deployed only because the United States has adopted and maintained a policy of technology neutrality. If the Commission had put itself in the position of mandating a 2G or 3G technology or limiting the flexibility of operators to deploy the technology of their choice in their licensed spectrum, it is doubtful that the panoply of technologies described herein would ever have gotten past the drawing board. The Commission's technology neutrality policy has been critical to the growth of the U.S. wireless industry, the activity in the capital markets relating to wireless, and the leadership position of the U.S. around the world. It remains vitally important that the Commission maintain this policy.

Moreover, the Commission's policy of protecting licensed spectrum from harmful interference has also been critical to the proliferation of wireless technology over licensed PCS and cellular spectrum. CDMA technology, whether in the 2G or 3G flavors, depends on a relatively quiet environment, free from harmful interference. Unlicensed technologies may serve as a complement to licensed technologies in certain limited circumstances (college campuses, airports, hotel lobbies, etc.), but they should not be permitted to operate in licensed spectrum. As

QUALCOMM has shown in its filings in a series of Commission proceedings, such as the UWB and Interference Temperature proceedings, CDMA networks will suffer a significant loss of capacity, and CDMA wireless phones will suffer a significant loss of battery life, if the Commission were to permit the level of interference temperature or other forms of unlicensed noise to rise by even what the Commission considers to be a relatively modest level, such as 1 dB. The Commission should allocate dedicated spectrum for unlicensed operations and dedicated spectrum for licensed services and should not perpetuate the idea of underlays and overlays. Moreover, the Commission should maintain a balance in the amount of spectrum allocated for each, rather than continuing to favor unlicensed services in making new allocations as the Commission has done of late.

These twin policies—technology neutrality and protection from harmful interference through allocations of dedicated spectrum—are at the core of the Commission’s obligations to act in the public interest and yet, these policies are very much at stake in several pending Commission proceedings. For example, in the Commission’s Wireless Harmonization Biennial Review proceeding, WT Docket No. 03-264, the Commission is considering revisions to the limit on the power of PCS base stations. The Commission should not adopt power limits that would enable PCS operators with GSM and TDMA networks to operate base stations with greater power than CDMA2000 and WCDMA networks. Operators who are deploying wireless broadband technologies deserve a level playing field in the FCC’s technical rules, and there is no public policy justification for disfavoring the technologies that operators will use for wireless broadband service.

Similarly, in revising the rules for equipment authorizations, the Commission is considering making changes to streamline the rules governing approval of Part 15 modules, in

ET Docket No. 03-137. QUALCOMM has pointed out that there are no rules today governing the approval of Part 22 (cellular) and Part 24 (PCS) modules and has asked the Commission to adopt such rules to establish a streamlined process for the approval of such modules.

Streamlining the approval process with a clear set of rules will aid vendors who wish to embed 1xEV-DO and WCDMA modules inside laptops and non-phone PDAs, thereby furthering the proliferation of these technologies.

High-quality, high-speed wireless broadband service over licensed spectrum will continue to grow in the United States and around the world at a rapid rate. If the Commission adheres to the fundamental policies that it adopted that lead to the proliferation of PCS and cellular service in the first place, its policies will be in line with the development of, and enhancement to, these exciting technologies.

VI. Conclusion

QUALCOMM is pleased to present the Task Force with these Comments and the accompanying materials and would be happy to provide the Task Force with any additional information it may desire as it completes its work.

Respectfully submitted,

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